Mathematics and Natural Philosophy (£100 for three years), John Weir; James Ferguson Bursary in Mathematics (£70 for two years), William Weir; Breadalbane Scholarship in Mathematics (£50 for three years), James Hamilton, M.A.; John Clark (Mileend) Scholarship in Natural Science (£50 for four years), William Huntly, M.A.; John Clark (Mileend) Scholarship in Classics (£50 for four years), James McMillan.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, November 16.—On *Megalania prisca*, part 4, by Prof. Owen, F.R.S.—The author, referring to a remark during a discussion following a previous communication (April, 1880), on the great horned Saurian of Australia, viz. that the skull then described might have belonged to a Chelonian, not to the genus and species founded on fossil vertebræ from localities remote from the formation yielding the cranial evidence, proceeded to describe his latest received fossils from the river-bed in Darling Downs, which included, besides evidences of the pelvis and limbs of *Megalania*, also dorsal vertebræ identical in size and character with those on which the former existence of such large Saurian had been predicted (1858). The contiguity of the last discovered vertebra, by Mr. G. F. Bennett, to the cranial and caudal fossils previously found and transmitted by him to the author, and the absence of any remains of a Chelonian reptile in the whole extent of the dried up bed of the river so perseveringly explored by that gentleman, would permit no doubt, the author believed, as to the conclusions which had been admitted in the previous volumes of the *Philosophical Transactions*.

Linnean Society, November 16.—F. Crisp, LL.B., Treasurer, in the chair.—Mr. O. T. Olsen and Surgeon J. N. Stone, R.N., were elected Fellows.—Dr. W. C. Ondaatje exhibited and made remarks on some Ceylon plants, among these, the fruit of *Randia dumetorum*, a remedy for dysentery; the leaves of *Sethia acuminata*, anthelmintic, and the resin of *Semecarpus gardneri*, from which a black varnish is prepared.—Mr. W. T. Thiselton Dyer called attention to a specimen of *Cycas beddomei*, a new species from Southern India.—Mr. F. P. Balkwill exhibited a series of British Foraminifera under the microscope, and said a few words on the special mode of mounting the same.—Mr. F. J. Hanbury showed a large fungus grown in a City wharf cellar, and which Mr. G. Murray pronounced to be a species of *Lentinus*.—Mr. C. Stewart exhibited a specimen of *Pilobolus*, explaining his observations on the projection of its sporangia.—Mr. J. G. Baker read a paper on the flora of Madagascar. It contains descriptions of 140 new species of polypetalous dicotyledons, obtained by the Rev. R. Baron and Dr. G. W. Parker. Some are of widely-diffused tropical genera, such as *Eugenia*, *Crotalaria*, &c.; others are of more familiar temperate types—*Alchemilla*, *Clematis*, and *Polygala*. Still others are characteristic of the Cape flora now noted for the first time from Madagascar, such as *Sphedamnocarpus* and *Sparmannia*. There is an interesting new genus of Malphigiaceæ (*Microsteira*) allied to the American *Hiræa*. Representatives of *Hibbertia* and *Rulingia* are interesting, from their being characteristically Australian genera. Mr. Baron has rediscovered *Rhodolæna alterola*, a showy plant, originally found by Du Petit Thouars a century ago. Dr. Parker has paid special attention to the drugs, esculents, and timber trees of the island, and catalogued 300 native names of the same.—A note by Mr. E. P. Ramsay, on the type specimen of Finsch's Fruit Pigeon was read.—Dr. Maxwell Masters read a communication on the Passifloræ collected in Ecuador and New Granada by M. Ed. André. Of *Tacsonia* 9 species are mentioned; of *Passiflora* 29 species, four being new. Some are of special interest structurally, the excellence of the specimens enabling ample examination of the curious flower structure to be made.—A paper was read on cerebral homologies, by Prof. Owen. He compares the brain of the locust and the cuttle-fish with that of the fish, and other higher forms, and summarises as follows:—That the homologies of the primary divisions of the brain in molluscs are the parts known in Articulates as the supra- and sub-œsophageal ganglions, with their commissural cords. That the topical relations of these parts to the gullet are the same in both great divisions of invertebrates; and that the homologies of the aforesaid parts with the primary divisions of the vertebrate brain are affected solely by the altered relation thereto of the gullet and mouth.—A paper was read on *Cassia lignea*, by W. T. Thiselton Dyer.—Thereafter, the sixteenth contribution to the molluscа of the *Challenger* Expedition by the Rev. R. Boog Watson, was read, in which were described the families Fissurellidæ and Cocculinidæ.

Chemical Society, November 16.—Prof. Dewar, vice-president, in the chair.—It was announced that a ballot for the election of Fellows would take place at the next meeting (December 7).—The following communications were made:—Contributions to the chemistry of tartaric and citric acids, by the late B. J. Grosjean. This paper has been compiled by Mr. Warington from the laboratory note-books left by the author. It contains investigations as to the loss of water by different specimens of citric acid, the determination of citric acid in lemon, bergamot, lime, and orange juices, the influence of heat on solutions of a totartaric acid, influence of sulphuric acid on the crystallisation of tartaric acid, action of solutions of potassium and sodium sulphates on calcium tartrate, determination of free sulphuric acid in tartaric acid liquors, determination of tartaric acid by precipitation as bitartrate, &c.—Contributions to the chemistry of bass fibres, by C. F. Cross and E. J. Bevan. The authors detail further experiments, showing that lignified fibres are to be regarded as a chemical whole rather than the mixture which was necessitated, viz. the incrustation theory.—On the oxidation of cellulose, by C. F. Cross and E. J. Bevan. By the action of boiling 60 per cent. nitric acid, cellulose is converted into an amorphous substance $C_{18}H_{26}O_{16}$, oxycellulose.—On the analysis of certain vegetable fibres, *Annanassa*, *Musa*, *Phormium*, *Linum*, *Urtica*, &c., by C. S. Webster.—On the constitution of some bromine derivatives of naphthalene (third notice), by R. Meldola. The author concludes that Glaser's α dibromnaphthalene and Meldola's metadibromnaphthalen are isomeric, and not identical. The author has also obtained by the diazo reaction β dibromnaphthalene, m.p. 81°, a new tribromnaphthalen, m.p. 113–114, a second melting at 63°, &c.—On the constitution of lophin (second notice), by F. R. Japp. The author brings forward fresh proofs that this body has the constitution of an anhydrobase, and not that ascribed to it by Radziszewski.

Geological Society, November 15.—Dr. J. Gwyn Jeffreys, F.R.S., vice-president, in the chair.—John Edmund Thomas and Joseph Williams were elected Fellows of the Society.—The following communications were read:—The drift-beds of the North-west of England and North Wales; part 2, their nature, stratigraphy, and distribution, by T. Mellard Reade, C.E., F.G.S. The author stated that the first part of this paper, read in 1873, treated of the low-level boulder clay and sands, specially in relation to the contained shells. Since that time he has been diligently collecting information to enable him to treat of the nature, origin, and stratigraphy of the drift lying between Liverpool and St. Bees and Liverpool and Carnarvonshire. The author's conclusions are that an ice-sheet, radiating from the mountain district of the English lakes and the south of Scotland, produced the planing and grooving of the rock and the red sand and rubble *débris*; then the ice melted back into local glaciers, and the submergence began. The low-level boulder-clay and sands were, during a slow submergence, laid down probably at depths of from 200 to 300 feet, and the author considers that all the phenomena can be satisfactorily accounted for by ordinary river-action and fraying of the coasts by the sea, combined with frost and ice due to a severer climate bringing down the materials of such river-basins to the sea, while icebergs and coast-ice sailed over, dropping on the sea-bottom their burdens of erratic stones and other materials from the mountain-districts of the north. He pointed out, also, that the great majority of the well-glaciated rocks were specially those that could be traced to the high lands. This fact was forced upon his notice after making a large collection of glaciated boulders and pebbles. Among the rocks he had been able to identify, with the help of Prof. Bonney and Mr. P. Dudgeon, of Dumfries, Scawfell granite (Eskdale, of Mackintosh) was the most abundant granite; then came grey granites from Dumfries, syenite from Buttermere, which occurred all over the area described, and up to 1200 feet on the Macclesfield Hills, and syenite from Cannockfell. Other probable identifications were also named. The whole series of rocks from the Silurian to the New Red Marl were represented in the low-level boulder-clay; a few flints also occurred, and one piece of what was believed to be chalk. The paper concluded with an appendix by Mr. David Robertson,

giving a list of the Foraminifera and other organisms found in the various beds of boulder-clay in the Atlantic Docks, Liverpool.—On the evidences of glacial action in South Brecknockshire and East Glamorganshire, by Mr. T. W. Edgeworth Davy. Communicated by Prof. J. Prestwich, F.R.S. The area which is included in this paper is about 200 square miles, extending north and south from the Brecknockshire Beacons to a line between Cowbridge and the mouth of the Rhymney, of which the Cly valley has been more particularly studied. Most of the rocks in this district, and particularly the Millstone Grit, retain traces of glacial markings. The whole area has a *moutonnée* aspect.

Anthropological Institute, November 14.—Mr. Hyde Clarke, vice-president, in the chair.—Mr. R. W. Felkin exhibited a Darfur boy who was rescued from slavery and brought to England by him in 1879.—Mr. Francis Galton exhibited a box about the size of a backgammon board, containing a geometric series of test weights for comparing the sensitivity of different persons. The test lay in ascertaining the smallest difference that could be perceived when handling them. The lowest weight was 1000 grains, which gives no uncertain sense of heaviness, and the highest weight was far short of what would fatigue the hand. Consequently, by Weber's law, the difference in the sense of heaviness produced by handling any two of the weights is the same, or nearly so, whenever those weights are separated by the same number of terms. For example, a person who could just and only just distinguish between the 4th and the 8th weight would do the same as regards the 2nd and the 6th, and the 6th and the 10th, the number of terms interval being 4 in each case. Again, as the only interpretation possible to the phrase that "the sensitivity of A is r times as great as that of B," is that A can perceive r grades of difference when B can only perceive one, it follows that the relative sensitivity of two persons is inversely proportionate to the number of terms between any pair of weights that they can respectively just discriminate. The unit of ratio was 2 per cent., but in the earlier terms there was a sequence of half units. The weights were made exactly alike in outward appearance; they were common gun-cartridges, stuffed equably with shot and wads and closed in the usual way. The term in the series to which each weight belonged was written on the wad that closed it. It was shown that the best economy of time was to present the weights in threes, to be sorted in their proper order. By making a proper selection, a wide range of testing power could be obtained by 30 cartridges ranged in 10 trays. The same principle admits of being extended to testing the delicacy of other senses, as taste and smell. Some provisional results were mentioned: (1) that intellectually able men had, on the whole, high powers of discrimination; (2) that men had more discriminating power than women; (3) that highly sensitive women did not seem able to discriminate more grades than others, though both sensation and pain were induced in them by lower stimuli; (4) that the blind, as a whole, were not peculiarly sensitive to this test, but rather the reverse. A discussion followed, in which Prof. Croom Robertson, Dr. Camps, Mr. Sully, D. Mortimer Granville, Dr. Mahomed, Mr. C. Roberts, Prof. Thane, and others took part.

Royal Horticultural Society, November 14.—Dr. M. T. Masters in the chair.—*Proliferous Flowers:* The Rev. G. Henslow exhibited a *Rhododendron balsamiflorum aureum*, with flowers arising from the centre of the pistil. The latter organ had dehisced longitudinally, and a cluster of malformed orange-coloured petals protruded from the orifice. He observed that every flower on one bush in his garden, of a common pink kind, had, during the last season, formed a blossom within the pistil, though in the latter case the flowers so formed had perfect as well as petaloid stamens. In every case the flower sprang from the axis at the base of the ovary. *Carnation:* a blossom with a secondary flower arising from within the calyx. *Blue-bell:* Each flower was borne on a pedicel of about two inches in length, and produced a secondary flower from the axil of a perianth leaf. In the place of one flower a complete raceme had grown.—*Solomon's Seal:* Leafy racemes occupied the positions of normal flowers.—*Monstrous Flowers:* He also showed the following:—*Pistillody of calyx in Violets*, in which the organs were in part or entirely virescent and malformed, having the sepals abortively ovuliferous, and the petals often laciniated. The sepals bore papiliform structures on the margins and midribs, resembling rudimentary ovules. The only recorded instance of ovuliferous sepals was that of the garden pea, figured and described in the *Gard. Chron.* 1866, p. 897. *Pistillody of stamens:* He showed drawings illustrating various stages of ovuliferous stamens of the Alpine poppy. *Syngenesism* in *Diplotaxis tenuifolia:* The anthers of every flower cohered laterally, so that the pollen could not escape; the consequence being that in no case did a flower set seed. *Placental protrusion* in *Begonia:* Portions of the placentas covered with ovules had protruded externally from the summit of the ovary, apparently being due to hypertrophy.—*Chrysanthemum:* Dr. Masters showed a blossom, half the florets being white, the other half yellow, a diameter separating the two kinds.

CAMBRIDGE

Philosophical Society, November 13.—On the structure of the spleen, by Mr. J. N. Langley.—On the continuity of the protoplasm in the motile organs of leaves.—Dr. W. H. Gaskell exhibited two pieces of muscular tissue from the ventricle of a tortoise, one of which had been taught to execute rhythmical contractions.

PARIS

Academy of Sciences, November 20.—M. Jamin in the chair.—A letter was read from the Minister of Public Instruction, giving an *arrêté* which fixes the conditions of the next Volta prize, to be awarded in 1887 (see p. 89).—Results of experiments made at the Exhibition of Electricity on incandescent lamps, by MM. Allard and others. In general and for the spherical mean intensity of 1·20 Carcel, only about 12 to 13 Carcels per h.p. of arc, or 10 Carcels per h.p. of mechanical work, can be counted on, from incandescent lamps. Electric candles give 40 Carcels per h.p. of arc, regulators nearly 100, so that, generally, the economic values of the three systems are nearly as 1, 3, and 7.—Researches on the iodide of lead, by M. Berthelot.—On the decomposition of cyanogen, by the same.—Researches relative to the vision of colour, by M. Chevreul.—On the relation of lunar to solar action in the phenomena of the tides, by M. Hall.—Chemical studies on Silesian beet (continued), by M. Leplay.—Electro-chemical deposits of various colours, produced on precious metals, for jewellery, by M. Weil. He presented pieces of gold and silver jewellery, polychromised industrially with oxides of copper, by his processes. The colours resist friction, dry or moist air, air vitiated by sulphuretted hydrogen or coal gas, and light. M. Edm. Becquerel recalled the colorations obtained by his father with oxides of lead and iron.—On a *sulphocarbometer* for determining the quantities of sulphide of carbon contained in alkaline sulphocarbonates, by MM. Gélis. A glass flask filled with a solution of bisulphite of soda or potash, has on its neck a metallic sleeve with internal screw-thread; into this is screwed a corresponding metallic tube with stopcock under the terminal bulb of a graduated and closed glass tube holding the sulphocarbonate to be examined. On opening the cock, the liquids mix. The reaction is completed when the sulphocarbonate becomes quite colourless; then the height of the column of sulphide of carbon is noted, and the weight of the sulphide of carbon that was in the sulphocarbonate may be deduced.—Results of treatment adopted in Switzerland with a view to destruction of Phylloxera, by M. Mayet (see p. 89).—On two standards of the *aune* and the *pied de Roi* recently found by M. Wolf. He found them in the maritime arsenal of Cherbourg. They are at present the sole representatives of an attempt at unification of French measures long before the birth of the metric system, and the only models of ancient measures preserved in their integrity.—Observations of the planet (216) Cleopatra, and of the great comet of 1882, at Paris Observatory (equatorial of the western tower), by M. Bigourdan.—Observations of the same comet at Algiers Observatory, by M. Trépied.—On the same, by M. Jaubert. He notes (from the Popular Observatory) that the central part, or true tail, had a paler envelope, which nearly ceased to be visible as the comet rose above the horizon and the tail shortened—except a part nearest α Hydræ, which seemed brighter than at first.—On the solar energy, by M. Rey de Morande. The great uniformity of terrestrial vegetation till the Cenomanian epoch, and gradual differentiation since, according to latitude, the gradual invasion of southern regions by trees with caducous leaves, and disappearance of all vegetation in Polar regions, are phenomena explicable by gradual contraction of the sun, but inexplicable by gradual cooling of the earth.—On the works of Frederic Houtman, by

M. Veth.—On the functions of a single variable similar to the polynômes of Legendre, by M. Hugoniot.—On the motion of a system of two electrified particles of ponderable matter, and on the integration of a class of equations with partial derivatives, by M. Lévy.—Production by the dry way of some crystallised uranates, by M. Ditte.—On the second anhydride of mannite, by M. Fouconnier.—Action of tri-ethylamine on symmetrical trichlorhydrine, and on the two isomeric dichlorhydric glycides, by M. Reboul.—Note on the study of *longrain*, and the measures of schistosity in schistous rocks by means of their thermic properties, by M. Jannettaz. The large axis of the isothermal surface is parallel to the *longrain* or second cleavage, and the small axis is perpendicular to the first cleavage or plane of schistosity.—Lithine, strontian, and boric acid in the mineral waters of Contrexeville and of Schinzmark (Switzerland), by M. Dieulafait.—Experiments on the calcination of alunite in powder, for manufacture of alum and sulphate of alumina, by M. Guyot.—On the anastomoses of striated muscular fibres in invertebrates, by M. Jousset de Bellesme. They insure simultaneous contraction (*e.g.* in gastric glands).—On the functions of the digitiform or superanal gland of Plagiostomes, by M. Blanchard. It appears to be a true pancreas.—Evolution of the epithelium of poison glands in the toad, by M. Calmels.—On two tertiary *Plagiaulax*, obtained in the neighbourhood of Rheims, by M. Lemoine.—On the *Tingis* of the pear-tree, by M. Carlet.—Some letters on the recent aurora were communicated.

BERLIN

Physiological Society, November 10.—Prof. Du Bois-Reymond in the chair.—Dr. J. Geppert gave an account of some experiments which he and Dr. A. Fraenkel had made on the effect of rarefied air on the organism, in order to test the statements which Prof. Paul Bert had made on respiration in rarefied air, and the accompanying deficiency of oxygen in the blood. The animal experimented on—a dog—was unfettered in a box of sheet iron, with a glass window, in which it was possible to produce every desirable pressure with an air-pump, and the ventilation could easily be accomplished during the attained rarefaction. If the gas pressure in the box was sinking, by degrees, the animal did not show any change in its behaviour or its functions until the pressure was reduced to 38 cm. Then and at a further lessening of the pressure, the animal became restless, the respiration grew deeper and faster; again, at a further rarefaction of air, the movements became uncertain and giddy; at a pressure of 25 cm., one-third atmosphere, the animal fell asleep like a normal sleeping animal, and could remain so six or seven hours without any hindrance to his later complete restoration; occasionally awakened, the animal had severe paroxysms of dyspnœa, which, however, soon passed, and it fell again fast asleep. By further rarefaction, nearly to 15 cm., severe paroxysms of dyspnoea and convulsions very soon caused the death. Nearly the same appearance and the same succession of phenomena aëronauts have described during balloon ascensions: in the first stage a quite normal feeling, then accelerated and deeper respiration, faintness of the limbs, which increased to paralysis; during the increasing inability of moving the voluntary muscles, drowsiness begins, from which there was no awakening if the balloon still rises to more rarefied regions, as was the case with the unhappy aëronauts Cravé, Spinelli, and Sivel. These symptoms differ in no way from the phenomena described in these experiments, but the stages begin much sooner, and the 25 cm. pressure at which the dog only fell into a deep sleep is the extreme limit of available rarefaction for the aëronaut. The cause of this more early beginning of the stages of disease may be first the low temperature of the higher regions which Mr. Glaisher showed to sink till −20°, and otherwise the continuous muscular activity causing stronger effects of the lower degree of rarefaction. Quite another appearance is presented by the mountain disease which is characterised by nausea, choking, and vomiting, besides the strong respiratory movements and increased heart's action. Dr. Geppert supposes that neither the often but moderate degree of rarefaction (60 cm. pressure) nor the trifling want of oxygen is the *vera causa*, but, as Mr. Dufour has already asserted, the extreme weariness of the body. (In the discussion which followed Dr. Geppert's communication, Prof. Du Bois-Reymond observed that some years ago he had advanced and proved the theory that the mountain disease, especially the vomiting on ascending high mountains, was a reflex phenomenon due to the very strong dazzling of the eyes by the vast intensely white and brightly insolated snow-fields.) Again, Dr. Geppert has made many measurements on the absorption of the oxygen by the arterial blood at varying gas tensions. The manner of blood-letting, the measuring of its volume, and the gas analysis, were much exacter and less objectionable than in the corresponding experiments of Mr. Bert, particularly for the measuring of the blood volume, an ingenious apparatus was used. The results of these experiments were that the proportion of oxygen in the arterial blood remained normal with decreasing oxygen tension, till the gas pressure was sunk to 40 cm. At further sinking of gas-pressure the proportion of oxygen in the blood decreased, and the deficiency of oxygen grew very considerable. Finally Dr. Gepper concluded that in the action of rarefied air on the proportion of the oxygen in the blood the physical absorption plays not so much a part as rather the chemical affinity for hæmoglobin for the oxygen.—Prof. Munk then reported briefly on experiments executed by Mr. Orshansky in his laboratory on the influence of anemia on the electric excitability of the brain; the anemia was produced by pouring the blood out of the femoral artery, and the excitability was tested in that part of the brain-surface which is the centre of motion of the fore and hinder legs, partly with the constant, partly with the inductive stream. In the first stages of the bleeding there was no change of excitability, then it increased, till about one-seventh of the total blood volume was poured out, then any further loss of blood continuously decreased the excitability, till finally, when about two-thirds of the blood was gone it sunk to zero. In every stage of anemia the maximum of corresponding change of excitability never appeared immediately, but some time after bleeding. Through all the changing of stages of excitability, except when the irritability was sunk to zero, re-creation and return to the normal state took place after an interval. No certain relation between the blood-pressure after the bleeding, and the rate of irritability corresponding to that state of anemia could be established.

VIENNA

Imperial Academy of Sciences, November 2.—T. Horbaczewski, on the synthesis of uric acid.—V. Patelt, on the development of the mucous membrane of the large intestine.—A. Tarolimek, on the relation between tension and temperature of saturated vapours and saturated carbonic acid.—E. Weiss, computations of the positions of the cometary nebulæ discovered by T. J. Schmidt, of Athens, on October 9.—Hr. Weidel and K. Hazura, on cinchonine.—R. Wegacheider, on isovanilline.—T. v. Oppolzer, on the criterion relating to the existence of three solutions of the cometic problem.—T. Wiesner, studies on withering leaves and leaf-shoot, a contribution to the knowledge of the transplantation of plants.

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